To pool or not to pool: Allocation of financial resources within households

Technical Report

THINK FORWARD INITIATIVE

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TO POOL OR NOT TO POOL: ALLOCATION OF FINANCIAL RESOURCES WITHIN HOUSEHOLDS *

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Abstract

In this report, we use ING Bank anonymised customer data to investigate the pooling of income, spending, saving and borrowing of Dutch households. We focus on the effect of age, children, and income on the pooling, controlling for unobserved household characteristics. We find that joint money management increases with age only among younger age groups, and no age effect in older age groups. The presence of children clearly triggers both the pooling of income and the pooling of savings, whereas income has a weaker association with pooling than observed in the statistical analysis. We also find that the pooling of income, the pooling of saving, and the pooling of borrowing are rather weakly correlated, implying that pooling rules can differ among households. The findings suggest that households require both separate and joint products covering different financial needs over the life cycle.

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1. Introduction

The management of financial issues differs between households: households can pool all their resources, called a full pooling system, while others keep all their resources separate in what is called an independent management system.[2] Usually, the full pooling of income and savings is considered standard household money management. However, with increasing female employment, more equal gender roles, and an increasing number of unmarried couples, money management systems have become more complex. Sonnenberg (2008) points out that individualisation in a family is associated with greater independence in the money management of couples. This individualisation has been thoroughly investigated in the United Kingdom (Vogler *et al.,* 2006; Pahl, 2008; Sonnenberg, 2008; Ashby and Burgoyne, 2009) and empirical evidence suggests more and more households are using partial pooling, that is, where part of the financial resources are joint while another part is kept separate. Households are often considered units with joint money management, but the actual situation is more diverse.

To better understand how financial resources and spending are shared within a household, the Intra-Household Project team implemented statistical and econometric analyses using an anonymised random sample of ING Bank customer data.[3] This is a follow-up study for a 2017 survey whose results are presented in the ING report `The Merit of Teamwork'. The survey data provide a good overview of separate and collective decision making in a household. In this report, we focus on an additional aspect investigated less often in the literature: how household financial resources are divided between individual and joint bank accounts. Transactional data give a detailed picture of the allocation of income, spending, saving, and borrowing in financial bank accounts.

We know that the use of transactional data does not reflect a one-to-one relation in a household's pooling system. As pointed out by Ashby and Burgoyne (2008, 2009) in qualitative surveys in the United Kingdom, some households without a joint account still consider that they are sharing their income, with spending from an individual checking account covering the common interests of family members. However, any adult can easily open any kind of bank account; therefore, the use of individual and joint accounts does reflect the pooling preferences of household members in terms of bank accounts. Since an individual account can be accessed only by its owner, all transactions from individual accounts require the owner's consent. A survey conducted by Woolley (2003) confirms that owners of individual accounts have primary access and control over their accounts. Joint accounts give equal usage rights to both partners, although rules can be set within a household for the use of joint accounts. Active use of individual accounts indicates that partners prefer independence in their everyday spending and saving. Ashby and Burgoyne (2008)

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[2] These pooling systems were introduced by Pahl (1995).
[3] The anonymised customer data, used for scientific purposes and data processing, follow General Data Protection Regulation rules.

also find that, in a partial pooling system, individual accounts are considered to be used independently, whereas joint accounts are managed together.

Several studies investigate income pooling and daily spending, but less is known about the pooling of savings or that of loans. Ashby and Burgoyne (2008) find that individual and joint saving accounts reflect the actual ownership of the resources; hence, the use of these accounts provides a good picture of the actual distribution of savings across partners. The same applies to the allocation of loan obligations. Therefore, we believe that the analysis of transactional data adds new insight into the intra-household allocation of resources.

In the analysis, we focus on households with two adult members – both of working age, that is, between 18 and 70 years old – with or without children, and earning a regular income. The sample is a random subset of anonymised ING Bank customers in the Netherlands. Although the customer base is not representative of the Dutch population, the sample consists of customers under different economic conditions and provides a good overview of the pooling of resources of households with two working-age adults across different socioeconomic groups. More precisely, we seek to understand the circumstances under which household members partially or fully pool their household income, spending, borrowing, and savings. The use of monthly panel data from 2014 to 2016 (36 months) enables us to analyse the triggers of changes in the pooling, controlling for time-invariant unobserved household characteristics.

We investigate the following questions:
- How do age, the number of children, and income determine the use of individual and joint accounts?

- What are the similarities and differences between the pooling of income, the pooling of spending, the pooling of borrowing, and the pooling of savings?
- Which factors increase pooling and which decrease pooling?

We expect that the use of separate and joint accounts changes during the life cycle as the needs of a family change, either because of children or because of changes in preference with age. Evidence from cross-sectional data on the relations between income pooling and the presence of children from the 2010 module of the European Survey on Income and Living Conditions (Nagy *et al.,* 2012) is mixed, whereas the academic literature finds a positive relationship between the presence of children and pooling (Vogler *et al.,* 2008).

There is no clear picture whether households choose the use of individual and joint accounts at an early life stage or whether they pool their resources gradually over time. Personal experience is considered to be the most important way to learn about financial management (Hilgert *et al.,* 2003). Hence, we hypothesise that households learn to cooperate, meaning that households extend their usage of joint accounts as they develop financial experience. Financial specialisation can also develop over time and partners could specialise in the tasks they are best able to perform. Ferber and Lee (1974) define the family financial officer as the partner who does most of the financial work, such as paying the bills and preparing tax declarations. However, we expect this task division to be less prevalent nowadays among younger households.

There is empirical evidence that income pooling is more common among low-income couples in European countries (Nagy *et al.,* 2012). Households

with tighter budget constraints pool more to gain efficiency, whereas less constrained households use the flexibility of pooling less. We investigate the circumstances under which household income influences pooling.

Several other factors affect the pooling system. Studies find that pooling has a strong relationship with marriage versus cohabitation (Heimdal and Houseknecht, 2003) and bargaining power within a household (Vogler *et al.,* 2008). We cannot investigate these aspects with transactional data, but we can control for them within households while obtaining an accurate picture of the effect of socioeconomic conditions on household financial management.

Econometric analysis shows that the prevalence of joint money management increases with age only for younger age groups, with no age effect in older age groups. Children clearly trigger both the pooling of income and the pooling of savings, whereas income is more weakly associated with pooling than seen in statistical analysis. We also find that the pooling of income, the pooling of savings, and the pooling of borrowing are rather weakly correlated, implying that pooling rules could differ across financial needs. We see greater complexity in household financial management than assumed with the two extreme cases when treating a household as a unit or when considering each household member operates individually. The findings imply that households need both separate and joint products covering different financial needs over the life cycle.

2. Data & Methodology

The sample consists of 10,000 households, a household defined as two adults living at the same address. The sample was randomly drawn from ING Bank data on customers with an ING checking account and regular income.[4] Three anonymous datasets were compiled covering household-level variables, product features, and flows between product accounts, respectively. Data for each product type – that is, checking accounts, saving accounts, investment accounts, pension accounts, credit card accounts, mortgages, and consumer loans – were obtained. The datasets contain monthly data from 2014 to 2016. The panel 36 months allows us to control for time-invariant unobserved household-level characteristics that are expected to affect the pooling and to draw conclusions from variations within households. A more detailed description of the data can be found in the Appendix.

We started analysing the data by comparing statistics on the pooling of income, the pooling of spending, the pooling of borrowing, and the pooling of saving for joint accounts across different socioeconomic groups, namely, across age groups, across different numbers of children, and across income groups.

Our econometric analyses use panel data models to investigate the extent of use of joint accounts, with socioeconomic characteristics and the ownership of other financial products as explanatory variables.

We run fixed effects (FE) models with different dependent variables, controlling for unobserved individual-specific characteristics and time effects. The FE model provides unbiased estimates of the direct effects of age, the number of children, and income on the allocation of resources, while other household-level time-invariant characteristics are not observed.[5] The methodology is explained more comprehensively in the Appendix.

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[4] The random sample is drawn from customers who manage most of their finances at ING Bank.

[5] The model does not control for unobserved household characteristics that change over time in correlation with observed variables.

3. Results

3.1 Households use joint accounts extensively for different purposes

When household members open a joint checking account, they do it for a reason. In most cases, they have more than one joint product and joint checking accounts are most often accompanied by a joint saving account(s) (about 80 percent of cases) or a joint mortgage(s) (about 25 percent of cases) in the sample.[6] Joint consumer loans and joint investment accounts are rare, because households own these product types less frequently: 11 percent of households in the sample own investment accounts, while 5 percent of households have consumer loans.[7] Among households with investment accounts, about 50 percent of these are joint accounts. Similarly, among households with a consumer loan, almost half are joint loans. The majority of mortgages are joint products (almost 90 percent), whereas pension and insurance accounts are all individual. We see that the use of joint accounts goes beyond everyday money management with a checking account; pooling also involves saving and long-term borrowing for home purchases.

The statistical evidence in panel (*a*) of Figure 1 shows that the ownership of joint checking accounts, as well as joint savings, investments, mortgages, and

Figure 1: Share of households with different types of joint accounts, by age in panel (a) and income in panel (b)
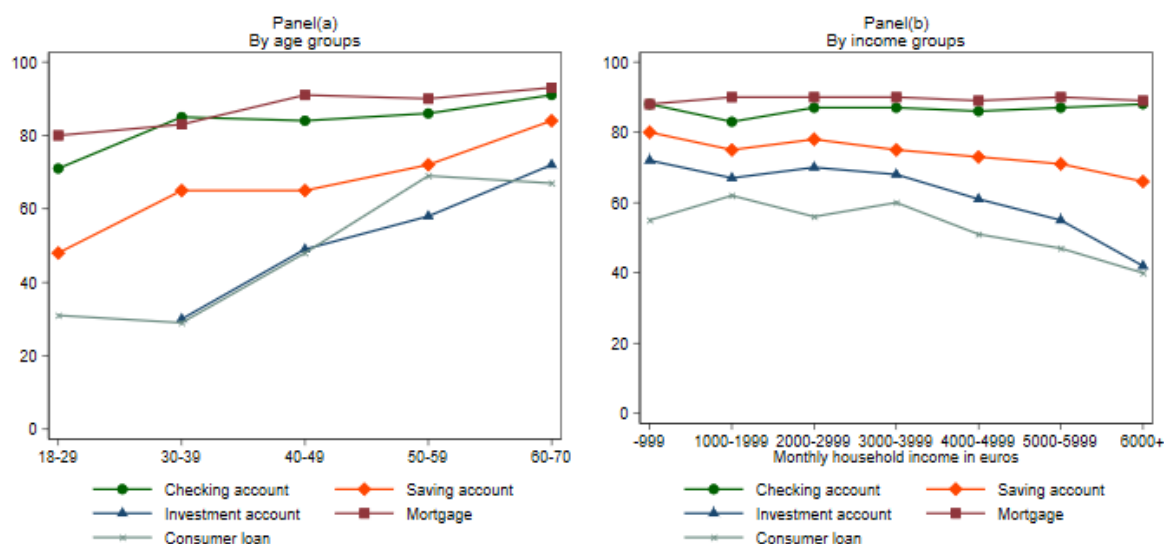
Notes. The shares are calculated for households with the respective product types.

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[6] We do not analyse each product but, rather, each product type. Households can have several joint checking accounts, so we consider these as having a joint product in the checking account product type.

[7] Low penetration of consumer loans may be because households have a consumer loan from another financial institution. Household Finance and Consumption Survey by European Central Bank shows that 27 percent of Dutch households owned non-mortgage debt in 2013 (ECB 2016).

consumer loans, increases with age. More precisely, the share of households with joint saving accounts from households which own any saving account is ca 50 percent among households with the oldest member in their 20s and the share is ca 85% among households with the oldest member in their 60s. Panel (*b*) illustrates that the ownership of joint accounts, conditional on owning respective product account, declines with higher income groups. The differences across age and income groups are more evident for joint saving and investment accounts and the shares of joint checking accounts and mortgages are similarly high among all income groups. Mortgages are typically considered a joint commitment.

The difference in ownership of joint accounts across age groups is a combination of several effects. First, we can expect the same households to change their preferences during their life time, a phenomenon called the *age effect*. Second, different generations can have different preferences; hence, older age groups with more joint products could have owned these joint products in an early life cycle stage. Generational differences are called the *cohort effect*. To understand the effect of age apart from the cohort effect, we estimate the FE model by relying on changes within households rather than differences between households.[8] We estimated the probability of a joint checking account, a joint saving account, and a joint investment account in separate models, controlling for household-specific characteristics and time effects.

The results (Figure 2) show that the probability of owning a joint checking account is higher when the

oldest household member is in his/her 30s, but the probability of a joint checking account does not increase with age. A similar pattern emerges for saving accounts. Hence, the increase in ownership of joint accounts in older age groups seen in Figure 1a could be induced by cohort effects rather than age effects, meaning that older generations could have owned joint accounts since any earlier age.[9]

The presence of children is not as strongly related to joint checking accounts as to joint saving accounts, meaning that the presence of children triggers households to start saving jointly. The presence of children does not trigger parents to open a joint checking account because such an account is usually already open by the time they have children. The regression analysis results show that the probability of joint checking and saving accounts *increases* with income, suggesting that the probability of joint checking and saving accounts increases when households reach higher income groups. This finding suggests that the statistical analysis results in Figure 1 – where the analysis does not control for age, children, or unobserved characteristics – would give a different picture for the relationship between household income and joint account ownership.

When looking at the probability of joint checking accounts and the ownership of other financial products, we find that households with savings or investments are more likely to own a joint checking account (regression results not shown here but available upon request). This finding is expected, since some of the saving and investment accounts are joint. Interestingly, households with pension
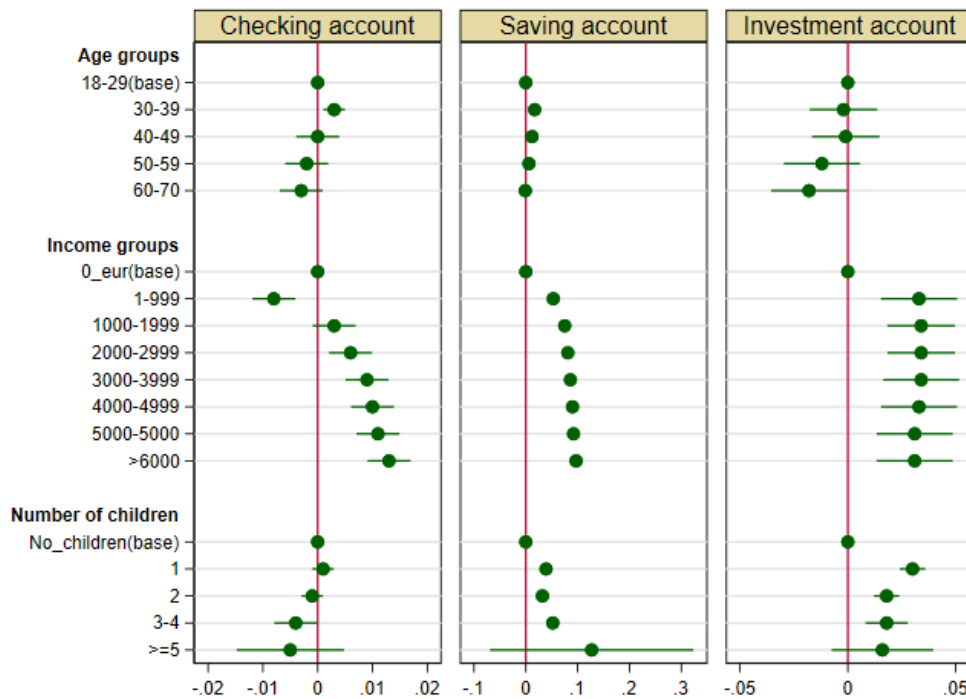
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[8] The current model specification assumes that the age effect is similar across cohorts.

[9] To estimate the cohort effect more explicitly, we would need to compare the same age groups across different decades, which is not possible with the current sample.

Figure 2: FE model results for the probability of joint accounts

Notes. The estimated coefficients are shown with 95% confidence intervals. Dummies denoting the ownership of different financial products and monthly time dummies are included in the model but not reported here.

savings, which are always individual, are also associated with a higher probability of a joint checking account, suggesting that households with long-term savings prefer joint money management. Saving, pension, and investment accounts seem to substitute for instead of complement each other, since the probability of a joint saving account is lower if the household has a pension or an investment account.

3.2 The extent of income pooling varies among households

Households typically do not add resources to their joint checking account from individual accounts but have their income transferred directly to it. Only some younger (age ≤ 29) households (about 20 percent) own joint checking accounts that do not receive regular inflow from direct sources, that is, from sources outside the bank.

The statistical analysis results (Figure 3a) show that full income pooling, where all resources go into a joint account, significantly increases with age. In the youngest age group, all income flows into the joint account for approximately every fourth household (with a joint checking account). In the oldest age group, about 75 percent of households fully pool their income. We also see that, for households with both individual and joint accounts, the share of income going directly into the joint account increases with age (Figure 3, panel (*a*)). The results of regression analysis (Figure 4), which rely on variation *within* households over time, confirm the statistical findings only to an extent, since the relationship between pooling and age is curvilinear: the share of inflows into joint checking accounts from total household inflows increases until the oldest household member reaches his/her 40s and then decreases; even older household members have a somewhat higher probability of opening a

joint checking account than household members in their 20s but the probability is still lower than for those in their 40s.

At lower income levels, about 80–90 percent of households pool their income fully in their joint checking accounts, whereas, at higher income levels, the incidence of full pooling drops to almost 20 percent (Figure 3, panel (*b*)). Looking at households that use partial pooling, we find that the share of pooling is a hump shaped function, increasing with income at lower income levels and starting to decrease when the monthly household income rises above €3,000. In the regression analysis results (Figure 4) for the probability of full pooling, the estimated coefficients for the income groups decrease slightly with income, but the coefficients are not statistically significant, suggesting that the relationship between income and full pooling is very weak. Hence, the statistics on

the pronounced decrease in full income pooling are not driven by income per se but, rather, other factors that are not controlled for in the statistical analysis. When modelling the share of income pooling in joint accounts, we find the share of inflow into the joint checking account decreases somewhat for households in higher income groups, confirming the statistical analysis results.

The presence of children increases income pooling to joint checking accounts. The first child increases the share of income going to the joint checking account and the third or fourth child increases the extent of income pooling even further. The probability of full pooling, that is, where all income goes into the joint checking account, increases remarkably with the third or fourth child (Figure 4). The results indicate that children trigger income pooling.

Figure 3: Share of income going into the joint checking account, by age in panel (a) and income in panel (b)
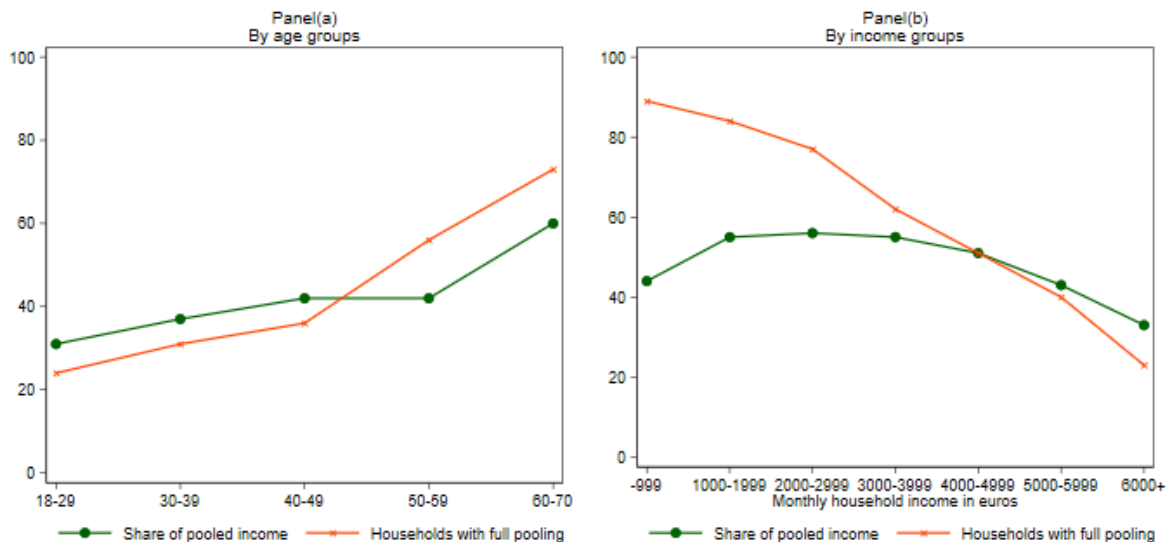
Notes. This figure shows the share of households that pool all their income (households with full pooling) and the share of pooled income from total income when households use partial pooling (share of pooled income).

Figure 4: FE model results for the share of income pooling in joint checking accounts
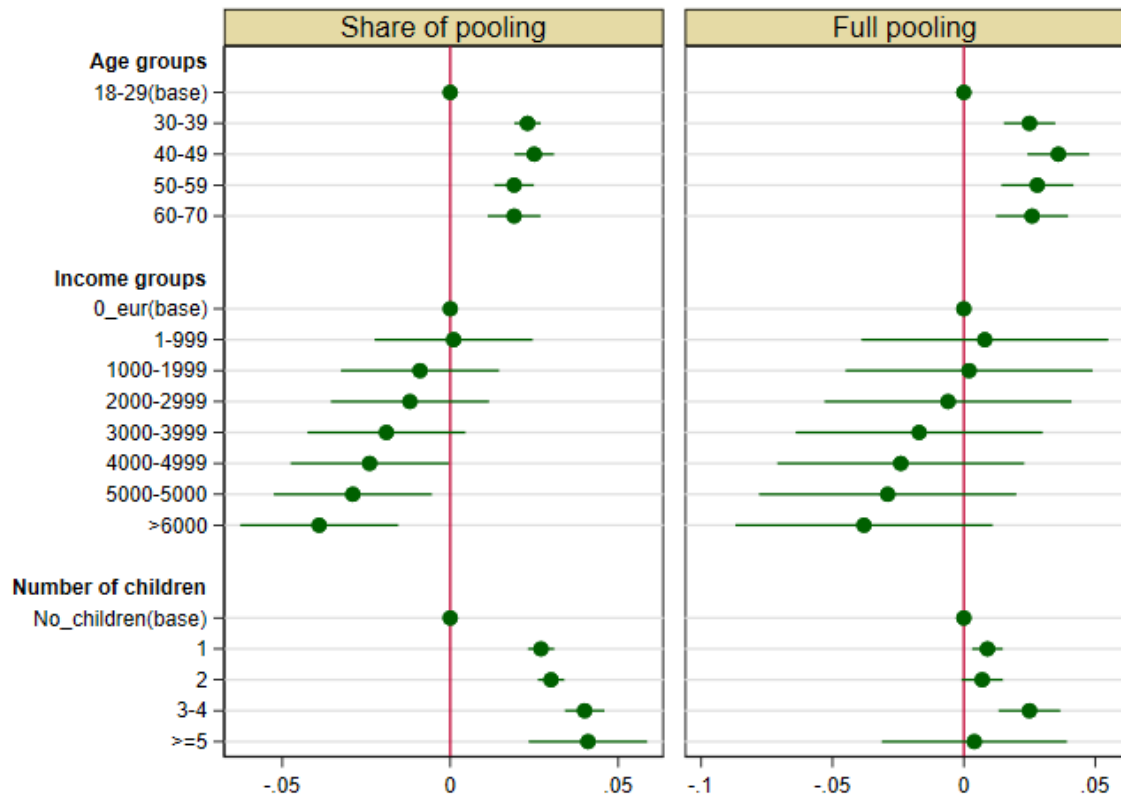

Notes. The estimated coefficients are shown with 95% confidence intervals. Dummies denoting the ownership of different financial products and monthly time dummies are included in the model but not reported here.

When a household opens a pension or an investment account, the probability of fully pooling inflows increases, suggesting that pension savers and investors, as well as those using individual investment accounts, prefer full pooling (regression results not shown here). In other cases, when a household opens a joint account for either saving, a mortgage, or a consumer loan, the share of income pooling to the joint checking account increases, whereas opening an individual account decreases the extent of income pooling.

With partial pooling, the share of income going to individual accounts could go to either one or both household members. The transaction data reveal that the number of households with monthly inflows to the individual accounts of one or both household members is about the same. There are also transactions from individual checking accounts to joint checking accounts. The statistical analysis results (Panel (a) of Figure 5) show that the contribution to joint checking accounts from individual checking accounts, by either or both partners (denoted 'transfers from...' in Figure 5), is more common among young households. There are also remarkable differences between household income levels. The higher the income, the less income goes directly to the joint account (not shown here), with the contribution to the joint account being conducted through an individual account instead.

Figure 5: Share of months with transfers from a joint checking account to an individual account and to a joint checking account from an individual account, by age in panel (a) and income in panel (b)
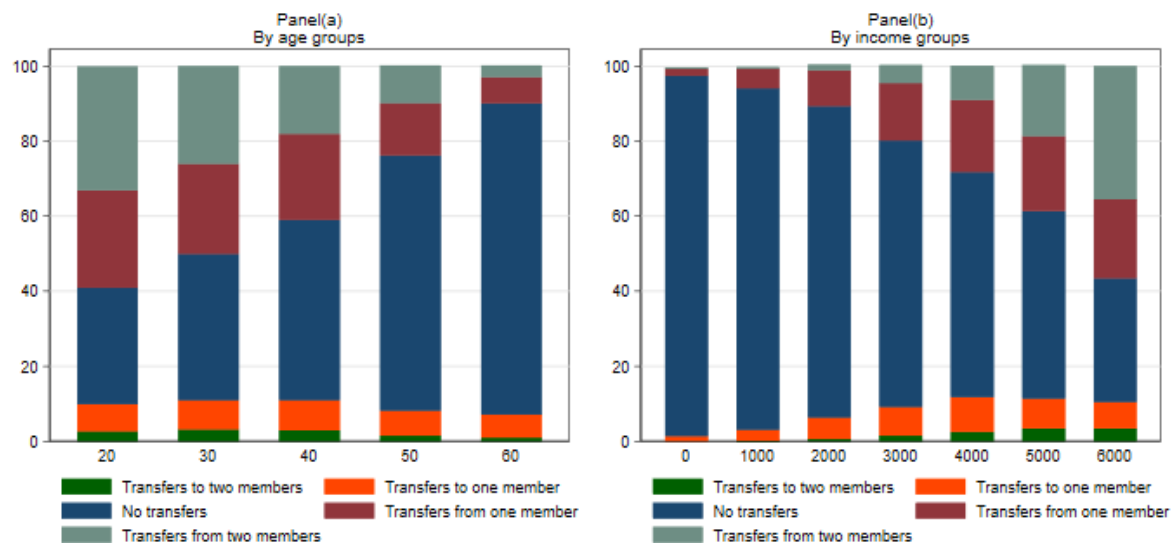
Notes. The sample period is 36 months. Transfers from a joint checking account to an individual account are denoted 'transfers to…' and transfers to a joint checking account from an individual account are denoted 'transfers from…'.

3.3 Pooling of spending mimics income pooling

Spending, or outflows, from joint checking accounts mimic inflows into joint checking accounts. The correlation between the share of inflows into a joint account and outflows from a joint account is 0.91 (Table 1). This is not surprising, given that the resources are transferred into a joint checking account for joint spending and saving purposes.

Figure 6 shows that the share of households in which all spending is carried out from a joint checking account increases noticeably with age and decreases with income. The difference across age and income groups is three to four times. Interestingly, slightly more households in each age group and in higher income groups use only their joint account for cash withdrawals and electronic payments in shops, compared to electronic transfers.

The share of pooled spending, that is, the share of spending from joint checking accounts, is slightly higher than the share of pooled income, that is, the share of income going into joint accounts, in all age and income groups (not shown here). This finding indicates that joint checking accounts play a larger role in covering spending than individual checking accounts do.

Although the joint checking account is usually intended for shared expenses, some households infrequently carry out transactions with their individual checking accounts. Figure 5 shows that younger households do so more often than older ones, usually sending funds to another household member (denoted 'transfers to' in Figure 5). The same pattern across age groups is seen for the same income groups (not shown here). The fact that younger households conduct transactions from individual to joint accounts and vice versa more frequently than older households indicates that the money management of younger households is more diversified than that of older households, either because they have not established the pooling rule yet or because they do not intend to set the rules because they prefer flexibility.

Table 1: Pairwise Pearson correlation coefficients for the share of transactions into and from joint checking accounts

	Income	Total spending	Electronic transfers	Electronic payments	Cash withdrawals
Income	1				
Total spending	0.91	1			
Electronic transfers	0.88	0.97	1		
Electronic payments	0.83	0.89	0.79	1	
Cash withdrawals	0.84	0.86	0.78	0.9	1

Figure 6: Share of households that fully pool spending to a joint checking account, by age in panel (a) and income in panel (b)
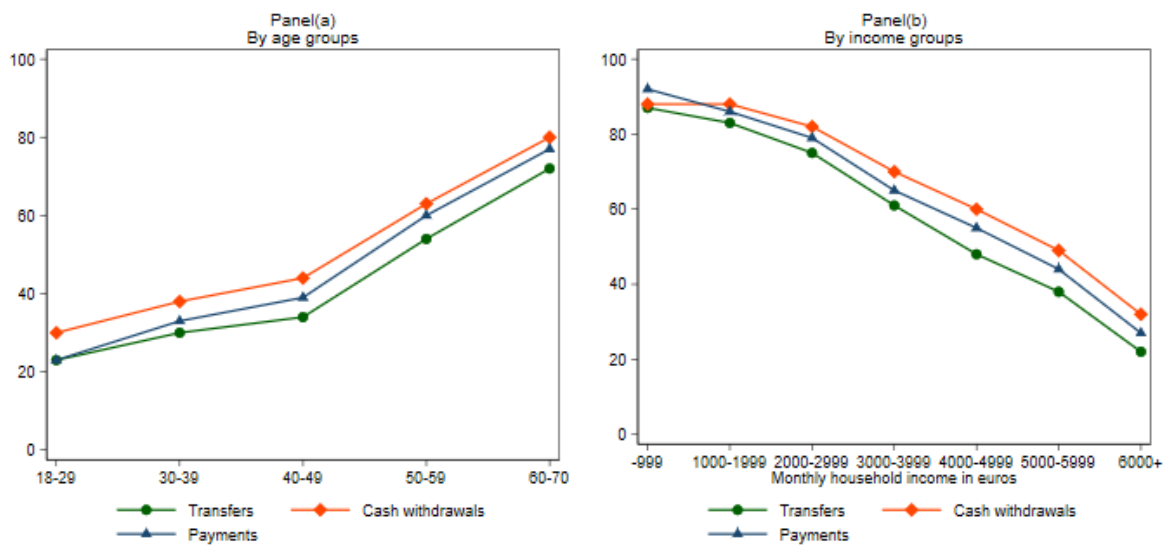
3.4 Joint borrowing and resource accumulation is common among households

Another dimension of pooling is the allocation of savings between joint and individual accounts. Hence, we investigate what amounts of financial assets are held in joint checking, saving, and investment accounts. Although the main purpose of joint checking accounts is everyday money management, a share of household resources is also kept in checking accounts and some households have no saving account, only a checking account. Thus, we include checking accounts to obtain a full picture of asset accumulation in all types of joint accounts.

We focus on households with joint checking, saving, and investment accounts to see what share of money is held in the respective joint accounts. Panel (*a*) of Figure 7 shows that the full pooling of resources into checking accounts is 2.5 times more frequent in the oldest age group than in the youngest. The differences across age groups in the share of households with full pooling into saving and investment accounts are even more obvious. Similarly, among households that hold their resources in both joint and individual accounts, the share in joint accounts increases with age (not shown here). Households with a joint home mortgage have almost all their debt in joint accounts, regardless of age or income level, indicating that the full pooling of mortgages is not

related to age or income. The pooling of consumer loans mimics the pooling of savings, that is, the share of households combining joint and individual loans.

Since the statistical analysis relies heavily on differences between households and not controlling for other factors except age, the regression analysis reveals the direct effect of age on pooling. The results of regression analysis (Figure 8) reveal that the share of resources kept in joint checking and saving accounts increases somewhat until the oldest household reaches their 40s and declines afterward. The probability of holding all resources in joint accounts even decreases with age (Figure 9) and is lowest when the oldest household member is in his/her 50s. The same pattern is seen for both checking and saving accounts. Hence, the share of resources hold in joint accounts is not as linearly or as strongly positively related to age as the statistical analysis indicates and the regression results imply a nonlinear relationship between the pooling of resources and age.

The finding that the probability of fully pooling resources decreases with age differs from the finding that full income pooling into joint checking accounts increases until the oldest household member is in his/her 40s (Figure 4). Hence, even when we see that income pooling is increasing with age, the accumulation of savings is faster in individual accounts. This result is supported by the finding, explained in the previous section, that the share of spending in joint checking accounts is higher than the share of income going to joint accounts, implying that less income is saved jointly than individually.

When analysing the effect of the presence of children on the balance of the joint account, we see that the first child increases the share in joint checking and saving accounts but the presence of more children does not contribute additionally to the pooling of resources. Interestingly, a higher number of children *decreases* the probability of all resources being held in joint checking and saving accounts, despite the presence of children increasing income pooling.

Figure 7: Share of households fully pooling their resources into joint accounts, by age in panel (a) and income in panel (b)

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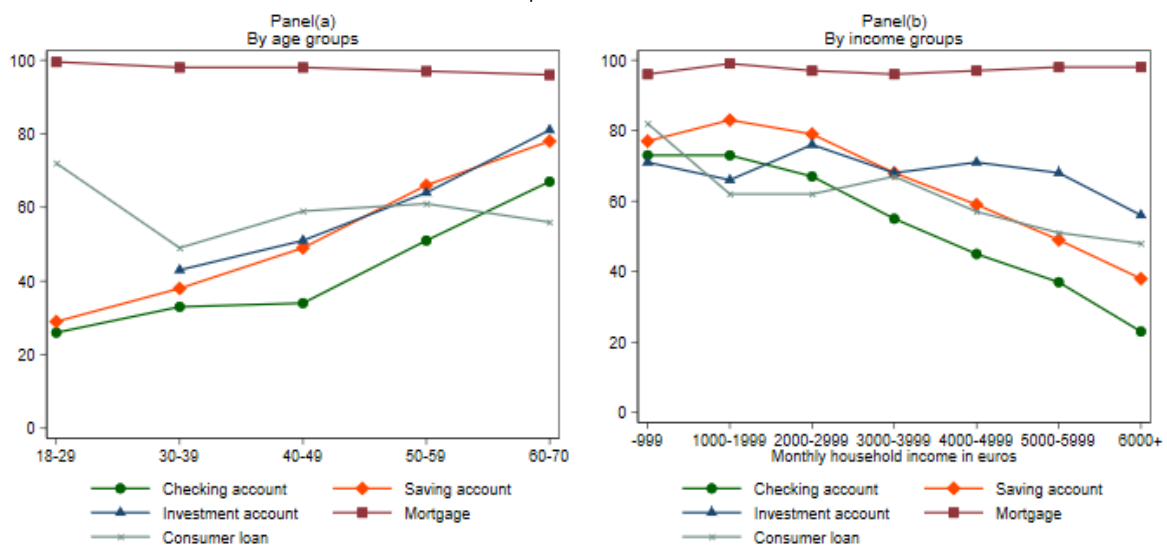
Figure 8: FE Model results for the share of accumulated resources in checking and saving accounts
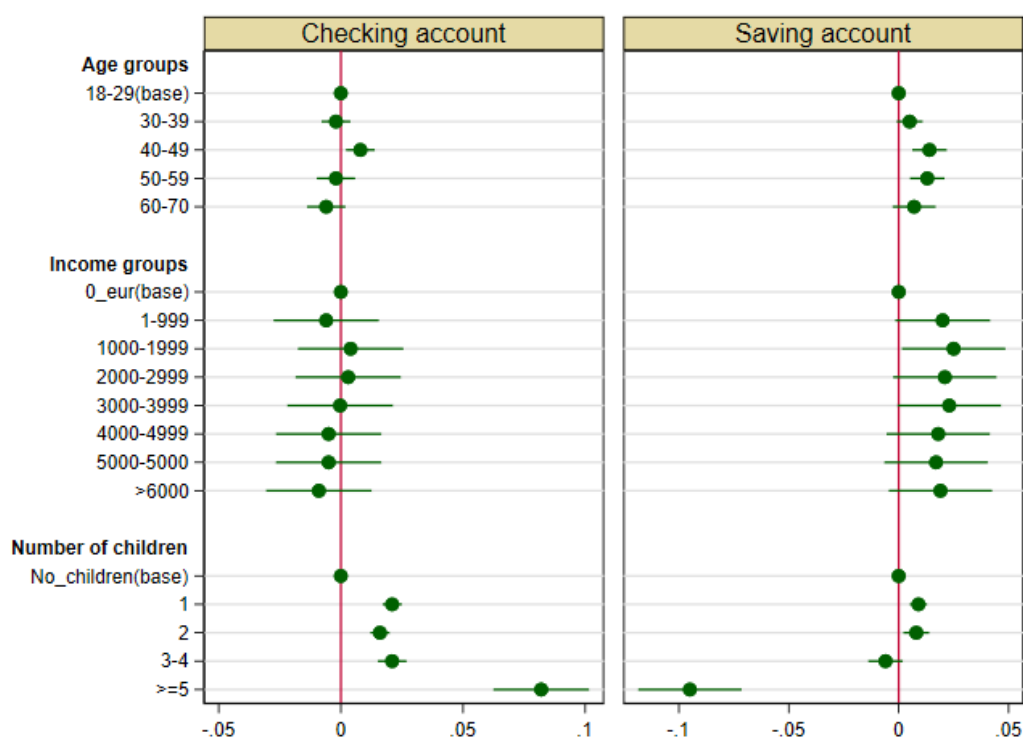
Notes. The estimated coefficients are shown with 95% confidence intervals. Dummies denoting the ownership of different financial products and monthly time dummies are included in the model but not reported here.

Regarding income groups, statistical analysis (Figure 7) shows that low-income households keep more of their resources in joint accounts. All resources in checking accounts accumulate in the joint account for about 75 percent of lower-income households groups, whereas, in the highest income group, with a monthly income over €6,000, about 25 percent of households pool their resources in checking accounts. Slightly more households in the high-income groups pool all their resources in saving accounts compared to checking accounts. There is a similar pattern among households that partially pool resources: the higher the household's income, the lower the share held in joint accounts. This is true for checking, saving, and investment accounts.

The regression analysis results (Figure 8) do not show a statistically significant relationship between income level and the extent of resources held in joint checking accounts, but there is a clear curvilinear pattern for the full pooling of resources in joint checking and saving accounts (Figure 9). The full pooling of savings increases slightly with the monthly household income, up to €2000–3000, and then starts to decline for higher income levels.

The estimated coefficient for the number of months since the opening of the joint checking account is positive and significant in the regression analysis (not shown here), indicating that the share of resources in joint checking accounts increases over time. Similarly, the number of months since the opening of the saving account is positively related to the share of resources in the joint saving account, suggesting that time, or experience, contributes to the pooling of resources. However, the effect is only marginal, confirming that households tend to choose the extent of pooling in early stages and change their pooling mainly because of other factors.

Figure 9: FE Model results for the full pooling of accumulated resources in checking and saving accounts
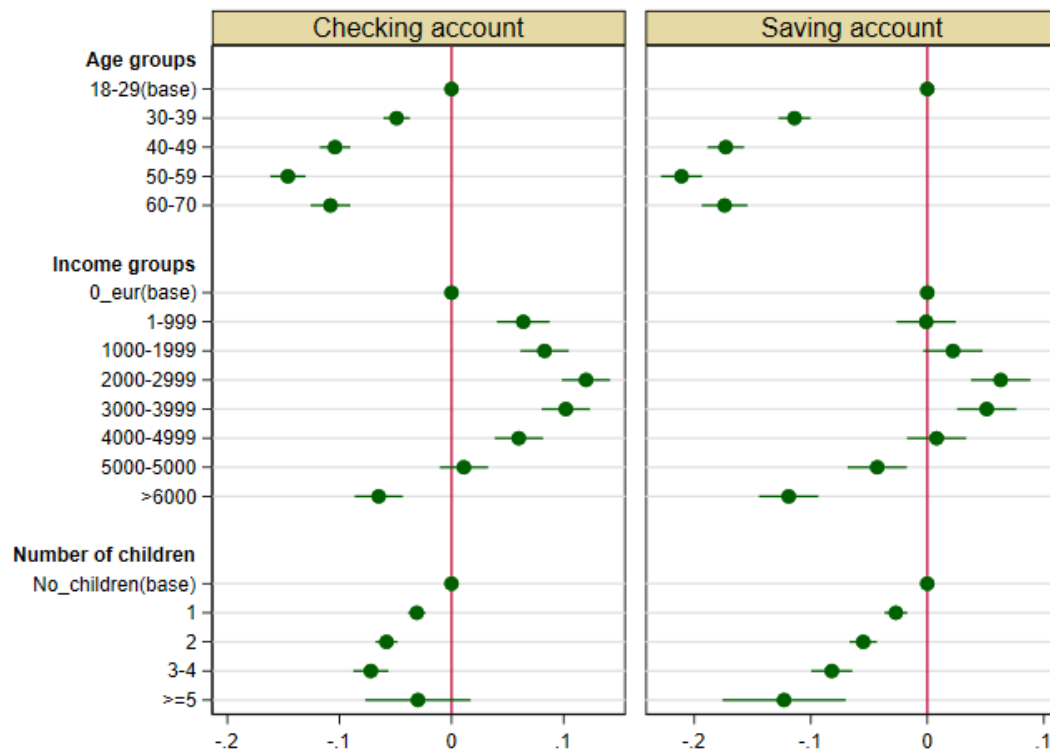
Notes. The estimated coefficients are shown with 95% confidence intervals. Dummies denoting the ownership of different financial products and monthly time dummies are included in the model but not reported here.

Households with a pension account, joint saving, or joint investment account hold a higher share of resources in their joint checking account, suggesting a positive association between saving and pooling in joint checking accounts. This result is consistent with the earlier finding that households that own saving or pension accounts prefer the full pooling of income. The ownership of a joint investment account is positively related to the share of resources in joint saving accounts, indicating that pooling of resources spills over into other saving products. An exception is mortgages. We find that households with a home mortgage, either joint or individual, hold a lower share of their resources in the joint saving account but a higher share in the joint checking account. Possible explanations are that households with a mortgage prefer to hold joint resources as liquid assets, since a checking account is more liquid than a saving account, or a joint mortgage can be considered a long-term investment, probably replacing joint savings.

3.5 The linkages between the pooling of different products are different

Do households that pool their savings pool their loans similarly? We find that households vary the pooling into their different joint product accounts. Table 2 shows that the share of income going into joint checking accounts and the share of spending from joint accounts are strongly correlated with the share of resources in the joint checking account (0.85 and 0.84, respectively). The correlation is somewhat weaker (0.64) between income pooling and the pooling of savings in joint saving accounts and even weaker for pooling in investment accounts (0.42). Surprisingly, although the majority of mortgages are joint, the share of mortgage pooling is not significantly correlated with income pooling.

Households holding more resources in joint checking accounts are also inclined to keep more savings in joint saving accounts. This correlation is rather strong (0.58) and much weaker between the share of resources in checking and investment accounts.

The pooling of accumulated resources, in either checking, saving, or investment accounts, is not related to the pooling of mortgages or consumer loans, the estimated correlation coefficient is close to zero. The finding suggests that the pooling of accumulated funds and the pooling of borrowing are driven by different factors. Moreover, the pooling of mortgage does not show any correlation with the pooling of consumer loan.

Table 2: Pairwise correlation coefficients for the share of resources and debt in joint accounts

	Checking	Saving	Investment	Mortgage	Consumer loan	Income	Spending
Checking	1						
Saving	0.58	1					
Investment	0.4	0.23	1				
Mortgage	-0.01	-0.03	-0.05	1			
Consumer loan	0.06	-0.006	..	-0.006	1		
Income	0.85	0.64	0.42	-0.032	0.084	1	
Spending	0.84	0.62	0.4	-0.023	0.087	0.91	1

4. Conclusion

Several factors affect the use of individual and joint accounts. The results from transactional data do not reveal the decision-making process in a household, but the report provides a comprehensive overview of the use of joint checking and saving accounts and the allocation of resources between individual and joint accounts.

4.1 The money management of younger generations is more diversified

We see that younger age groups exhibit greater diversity in their financial arrangements, for example, joint resources in joint accounts are transferred not only directly but also often into joint accounts through individual accounts. These younger age groups tend to keep more resources in individual accounts compared to older age groups. The statistical analysis reveals a pronounced pattern between the use of joint accounts and age over all age groups, with apparently several effects, including generational shifts in preferences (cohort effect).

We also learned that households tend to choose the extent of pooling in an early stage and only marginally change the pooling system with age or experience. The probability of opening a joint account is the highest when the oldest household member is in his/her 30s and inflows into joint accounts increase until his/her 40s. Given their more diversified money management way, younger generations apparently require greater variety in terms of the features of joint and individual accounts.

4.2 The presence of children shifts households towards joint resources

Having children is a long-term joint commitment between partners and we find that the presence of children affects households' financial planning. Children trigger the opening of joint saving and investment accounts, increase the share of income pooling, and increase the pooling of joint resources in joint checking and saving accounts. The findings indicate that households not only face additional child-related expenditures that can be considered common expenditures covered from pooled funds, but also shift to joint products for saving purposes.

4.3 Income changes have a nonlinear relationship with full pooling

The insights about the direct effect of income on the use of joint accounts based on *within*-household changes over time from regression analyses are rather different from the findings when analysing the differences *between* households with statistical analysis. The ownership of joint accounts, that is, checking, saving, and investment accounts, increases with household income but the share of income going into the joint accounts decreases. This pattern suggests that, as their income increases, households extend the range of financial products, including joint accounts, in their portfolio. However, the addition of more joint products does not lead to greater income pooling. On the contrary, estimations using variation within households indicate that the importance of joint accounts decreases with higher income.

The accumulation of resources in joint checking and saving accounts increases with income at lower income levels, since there are more resources available and households gain from efficiency obtained through pooling. However, the share of joint resources in joint accounts declines when income increases at higher income levels, suggesting that, at a certain welfare level, household members start preferring to keep additional resources in individual accounts.

4.4 Households vary the extent of pooling for different products

The fact that households pool their mortgage does not imply that they also prefer pooling their savings. Households can use different pooling systems for different needs. We find that the pooling of income and the pooling of spending are strongly correlated but the correlation between the pooling of income and the pooling of savings is much weaker. The pooling of accumulated resources, either in checking, saving, or investment accounts, is not related to the pooling of mortgages or consumer loans. The results indicate that pooling rules could differ across financial needs.

To summarise, we find much greater complexity in household financial management than assumed with two extreme cases when treating a household as one unit and when considering each household member operating individually. The findings imply that households need both separate and joint products covering different financial needs over the life cycle.

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6. Appendices

Appendix A: Data

In our sample, a household consists of two adults between 18 and 70 years of age and living at the same address. The age difference between the two adults is less than 15 years, indicating that the household members in the sample are probably a couple. The household-related dataset contains information about the age of both household members. In the analysis, we use the age of the oldest household member as one of the characteristics of the household. Household income is calculated as the median of monthly inflows in the last seven months. Monthly inflows compile all inflows from outside the bank into all household members' checking accounts within a month. The household income level is used to analyse the differences in resource pooling across economic conditions. Information about the number of children in the household under the age of 18 is used to investigate the effect of the number of children on the use of joint accounts.[10]

The product-related dataset contains data for each product type, that is, checking accounts, saving accounts, investment accounts, pension accounts, credit card accounts, mortgages, and consumer loans. Each product type is divided into individual and joint accounts. A joint product is defined as a product where both household members own the account. The balance of the product type at the end of each month is used to calculate the share of resources in joint products from the total resources held in both individual and joint products.

Information on the starting date of the first joint account in each product type allows us to calculate the time since the start of the use of joint products. The third monthly transaction dataset provides monthly inflows and outflows into and out of individual and joint checking accounts, making it possible to analyse the share of inflows into and outflows from joint checking accounts. The resources for all the other joint products – saving, investment, mortgage, and consumer loan accounts – are transferred from joint checking accounts.

Appendix B: Statistical analysis

The statistical analysis as well as the regression models use age, income, and the number of children as categorical variables. The age groups are defined based on the age of the oldest household member and are as follows: 18–29, 30–39, 40–49, 50–59, and 60–70 years. The income groups are defined as zero, €1–999, €1,000–1,999, …, €5,000–5,999, and more than €6,000 of monthly household income, calculated as the median household monthly inflow in the last seven months. We categorise the number of children as zero, one, two, three or four, and five or more.

In the statistical analysis, we investigate the following financial measures related to pooling:

1. The number of joint product types, that is, checking accounts, saving accounts, investment accounts, mortgages, and consumer loans per household;

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[10] Since the data on children are collected indirectly, some data could be missing. This would lead to lower estimates.

2. The share of households with joint products, among households with the respective product types, that is, joint saving accounts among households that save, joint mortgage accounts among households with a mortgage, etc.;
3. The share of income going directly (i.e. from outside the bank) into joint checking accounts;
4. The share of spending from joint checking accounts, distinguishing between electronic payments, electronic transactions, and cash withdrawals;
5. The share of households fully pooling their income and spending among those with joint checking accounts;
6. The shares of balances held in joint checking accounts, saving accounts, and investment accounts from the total balance of the respective product types;
7. The share of households fully pooling savings and investments among those with joint saving and investment accounts, respectively;
8. The frequency of transactions between joint and individual checking accounts;
9. The correlations between the pooling of income and spending and between the pooling of mortgages, consumer loans, and resources in checking, saving, and investment accounts.

Appendix C: Econometric modelling

We use panel data models to investigate the effects of age, children, and income on the use of different types of joint accounts, controlling for unobserved individual-specific characteristics and time effects:

$$y_{it} = u_i + \sum_{k=1}^{4} \alpha_k AGE_{it} + \sum_{k=1}^{4} \beta_k CHLD_{it} + \sum_{k=1}^{7} \gamma_k INC_{it} + X'\delta + \tau_t,$$

where u_i denotes household effects, the estimated α_k captures the effect of each age group compared to the base group of 18–29 years, the coefficient β_k captures the effect from four categories of numbers of children compared to the group without children, the estimated coefficient γ_k captures the effect from income groups compared to the base group with zero income, X' denotes the matrix of other control variables, dummy variables indicate the ownership of other financial products, and τ_t denotes the time dummies.

We carry out the estimations with different dependent variables. The FE models provide unbiased estimates for the relationship between the explanatory variables and the dependent variable, since unobserved characteristics that could be correlated with the explanatory and dependent variables do not vary over time. For robustness tests, several different model specifications have been estimated, namely, pooled, random, and FE models, with a different set of variables, excluding or including some explanatory variables and adding lagged variables.

The first set of estimations uses linear probability models with household-specific effects for the probability of having a joint checking, saving, or investment account on the sample of all households with the respective product types.[11] Age, income, and the number of children are categorical variables in the model to allow for a nonlinear relationship between the probability of joint accounts and the

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[11] Linear probability models are used rather than panel binary models, because marginal effects can be estimated with panel logit models only when assuming no individual-specific effects. Angrist and Krueger (2009) show that linear probability models provide similar coefficients as for binary models. Note that the model cannot be used for prediction purposes.

explanatory variables. We use the ownership of other saving products (joint or individual saving or investment accounts, individual pension accounts) and borrowing (joint or individual mortgage or consumer loans, credit cards) as other explanatory variables. We estimate the model for the full sample and for different age groups separately to determine how the effect of income, children, and financial products on the probability of joint account ownership varies across the different age groups.

The second set of estimations uses similar model specifications to investigate income pooling. We use the sample of households with joint checking accounts and estimate the share of pooling. Additionally, we estimate the probability of fully pooling inflows into a joint checking account. We use the same explanatory variables as in the previous models.

The third set of estimations was implemented to examine the share of resources held in joint accounts among total resources in households' checking, saving, and investment accounts. The sample consists of households that own the respective joint accounts. We investigate the share of pooling and perform separate regression analyses for the probability of full pooling, meaning that all resources are held in a joint account. We also include the number of months since the opening of the joint product, dummy variables that show which other joint or individual products a household has, and dummies for being in arrears with joint and individual loans.

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